Mechanisms of Cancer Resistance against Antitumoral Drugs

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Objectives

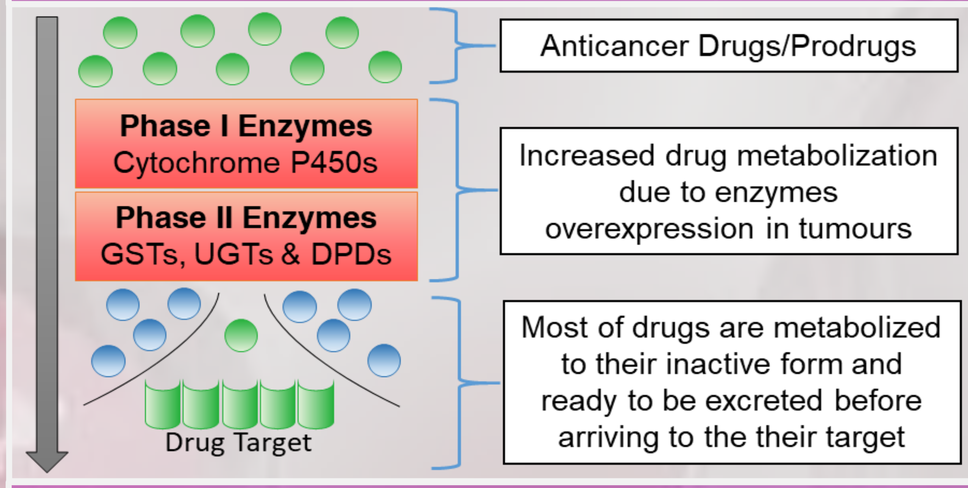
Provide an updated overview of the different and most important mechanisms of cancer resistance against antitumor drugs, mainly chemotherapeutics, in order to improve the development of therapies and the design of new drugs.

Introduction

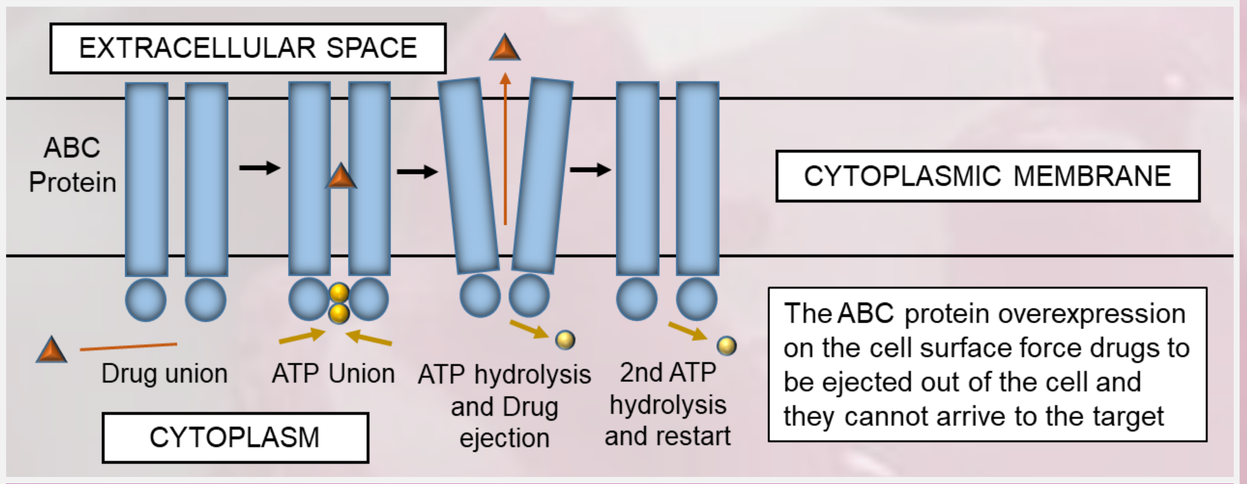
The chaotic nature of cancer makes its reaction to the different drugs unpredictable as they manage to evade its effects thanks to resistance mechanisms by specific and nonspecific methods. Furthermore, these resistances can range from a simple amino acid change, to drastic alterations in the expression of protein sets, important for cell behavior and vital functions.

Nonspecific Resistance Mechanisms

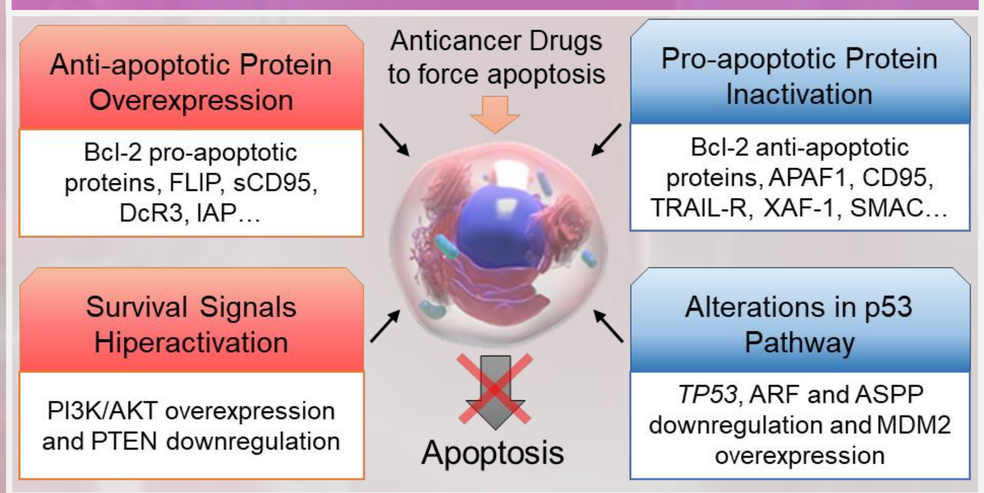
Metabolizing Enzymes Overexpression



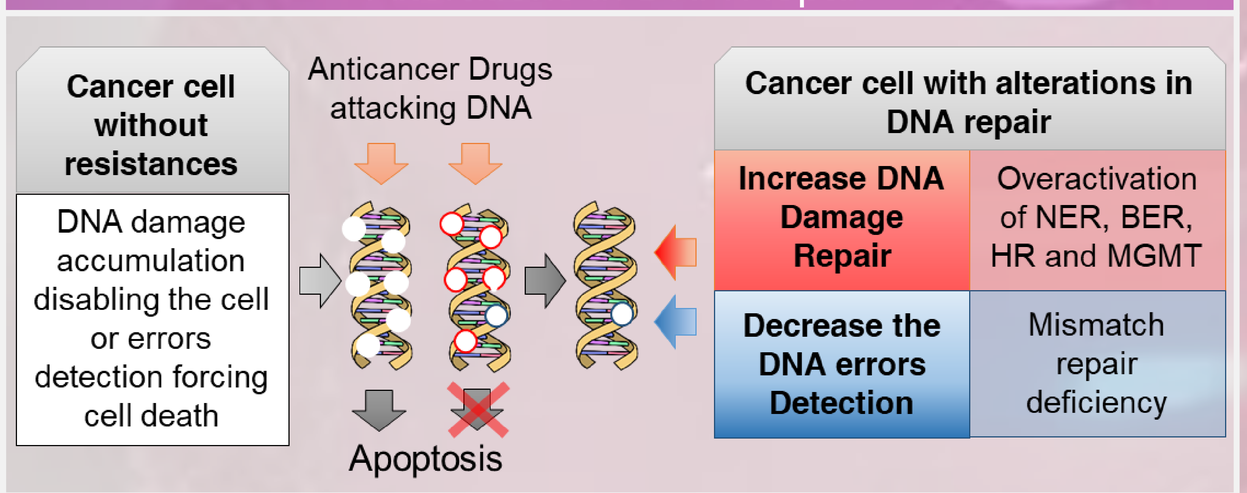
ABC Proteins Overexpression



Cell Death Evasion



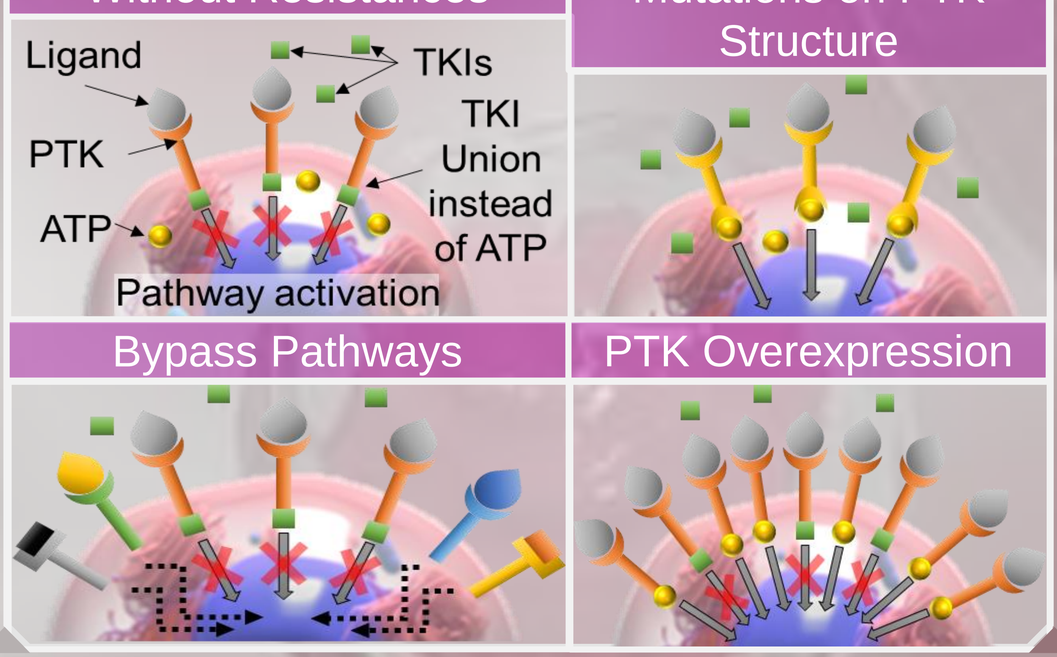
Alterations in DNA Repair



Specific Resistance Mechanisms

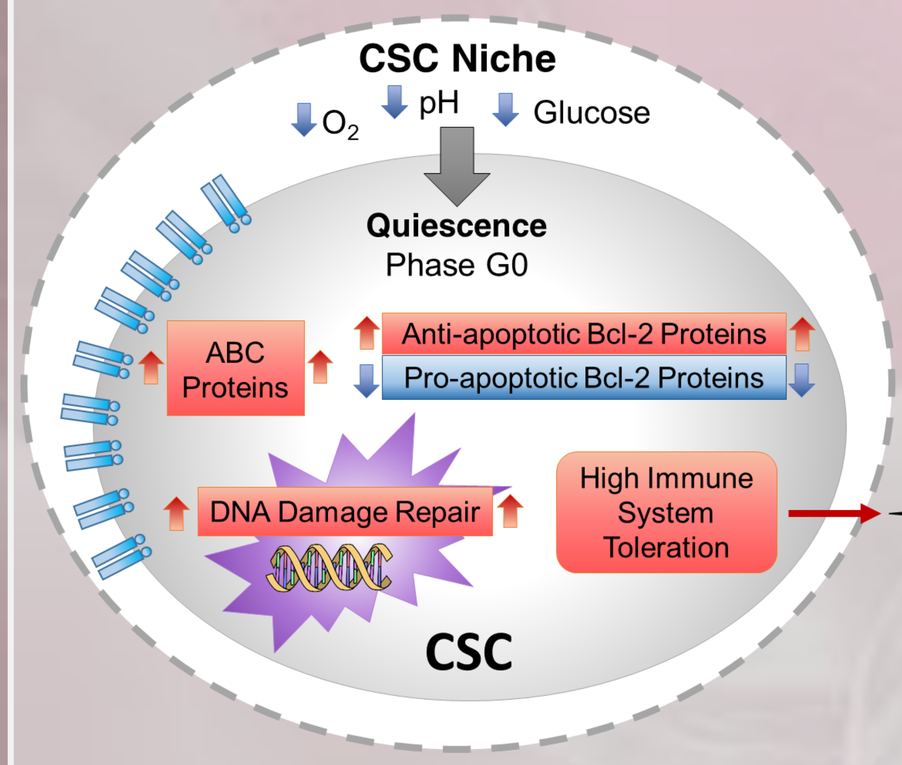
Mutations on the Cell Target	Bypass Pathways Activation	Amplification of the Protein Target	Subexpression of Proteins

PTK Specific Resistance Mechanisms against TKI



Cancer Stem Cells

CSCs are present in most cancers and are one of the main reasons of relapses due to their qualities as a stem cell that give them a high capacity for differentiation, resistance and survival.



Conclusion

The need to find new and better anticancer drugs is inexorable. Therefore, a good knowledge of the different and more frequent resistance mechanisms that have been discovered is vital, emphasizing the need to act in CSCs. The ideal would be to be able to individualize each case as much as possible to seek the development of combined and personalized treatments that are effective, safe and definitive for the patient, whether human or animal.